

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

- 1 1. (currently amended) A method of reducing phase noise detected using an
2 interferometric system comprising the steps of:
3 generating a light beam having a frequency that is intentionally
4 varied as a function of time and that includes undesired frequency fluctua-
5 tions, said undesired frequency fluctuations being phase noise;
6 directing a first beam portion of said light beam to a reference
7 interferometer, said reference interferometer having known optical charac-
8 teristics;
9 directing a second beam portion of said light beam to a test
10 interferometer;
11 detecting optical outputs for each of said reference and test
12 interferometers;
13 determining phase information regarding each of said optical
14 outputs; and
15 using said phase information that is specific to said reference
16 interferometer in combination with delay information that is specific to said test
17 interferometer and using said phase information that is specific to said test
18 interferometer in combination with delay information that is specific to said
19 reference interferometer to at least partially cancel said phase noise.
20 ~~for each particular one of said reference and test interferome-~~
21 ~~ters, using said phase information that is specific to said particular one and~~
22 ~~using delay information that is specific to the other of said reference and test~~
23 ~~interferometers to at least partially cancel said phase noise.~~
- 1 2. (original) The method of claim 1 wherein using said phase information and
2 said delay information includes calculating characteristics of a device under
3 test, where said device under test is connected to said test interferometer.

1 3. (original) The method of claim 1 wherein using said phase and delay
2 information includes determining for each time (t) in a time series:
3 an indication of a difference in a phase of said optical output of
4 said test interferometer at said time t and a phase of said optical output of
5 said test interferometer at a time offset from said time t by a known optical
6 delay introduced within said reference interferometer; and
7 an indication of a difference in a phase of said optical output of
8 said reference interferometer at said time t and a phase of said optical output
9 of said reference interferometer at a time offset from said time t by a time that
10 is representative of a delay introduced within said test interferometer by a
11 device under test (DUT).

1 4. (original) The method of claim 3 wherein generating said time series
2 includes determining a difference between said indications of said differences
3 for each said time t.

1 5. (original) The method of claim 4 wherein using said phase and delay
2 information includes determining group delay associated with said DUT, said
3 group delay being determined following said steps of determining said
4 indications of differences.

1 6. (original) The method of claim 1 wherein generating said light beam
2 includes activating a laser source in a sweep frequency mode.

1 7. (original) The method of claim 1 wherein said directing steps include
2 coupling said first and second beam portions to reference and test inter-
3 ferometers that define a heterodyne optical network analyzer.

1 8. (currently amended) An interferometric system comprising:
2 a source of coherent light configured to vary the frequency of
3 said coherent light within a range, said source being susceptible to irregular
4 frequency variations;
5 a reference interferometer coupled to said source to receive a
6 reference beam portion of said coherent light, said reference interferometer
7 having a known delay;
8 a reference detector optically coupled to said reference inter-
9 ferometer to generate a reference output signal representative of light
10 received from said reference interferometer;
11 a test interferometer coupled to said source to receive a
12 measurement beam portion of said coherent light, said test interferometer
13 being configured for optical coupling to a device under test (DUT) with a delay
14 that is susceptible to variations with said frequency;
15 a test detector optically coupled to said test interferometer to
16 generate a test output signal representative of light received from said test
17 interferometer; and
18 a processor configured to at least partially offset effects of said
19 irregular frequency variations in an analysis of said DUT, said processor being
20 enabled to identify optical characteristics of said DUT following imposing said
21 delay of said DUT on said reference output signal and imposing said known
22 delay on said test output signal[.];
23 wherein said irregular frequency variations define phase noise
24 with respect to said analysis of said DUT.

1 9. (original) The system of claim 8 wherein said processor includes a first
2 differencing module and a second differencing module, wherein
3 said first differencing module has an input connected to receive
4 said test output signal and has an output that is indicative of a difference in a
5 phase of said test output signal as a function of time t and a phase of said test
6 output signal as a function of time $t - \tau_{RI}$, where τ_{RI} is said known delay of said
7 reference interferometer; and
8 said second differencing module has an input connected to
9 receive said reference output signal and has an output that is indicative of
10 a difference in a phase of said reference output signal as a function of said
11 time t and a phase of said reference output signal as a function of time $t - \tau_{I0}$,
12 where τ_{I0} is representative of a delay of said test Interferometer following said
13 optical coupling to said DUT.

1 10. (original) The system of claim 9 wherein said processor further includes
2 a third differencing module connected to said first and second differencing
3 modules and configured to generate a noise-cancelled signal that is indicative
4 of a time series of DUT analysis as the difference between said outputs of
5 said first and second differencing modules.

1 11. (original) The system of claim 10 wherein said processor includes a
2 module for applying said time series to determine a group delay that is
3 specific to said DUT.

1 12. (original) The system of claim 8 wherein said source of coherent light is a
2 tunable laser source.

1 13. (original) A method of reducing phase noise in an interferometric system
2 comprising the steps of:
3 continuously sweeping a laser light beam through a frequency
4 range, said laser light beam including said phase noise;
5 splitting said laser light beam between a reference heterodyne
6 interferometer having a known delay and a test heterodyne interferometer
7 having a group delay of interest;
8 generating a time series of analysis signal on a basis of outputs
9 of said reference and test heterodyne interferometers, including for each time
10 t within said time series:
11 (a) determining a first difference between a phase of a
12 test output of said test heterodyne interferometer at said time t and a
13 phase of said test output at said time t offset by said known delay; and
14 (b) determining a second difference between a phase of
15 a reference output of said reference heterodyne interferometer at said
16 time t and a phase of said reference output at said time t offset by a
17 delay representative of a delay of said test heterodyne interferometer;
18 and
19 using said time series to reduce effects of said phase noise in
20 calculations of said group delay of interest.

1 14. (original) The method of claim 13 wherein said step of determining said
2 second difference includes offsetting said time t by a mean of an estimation of
3 said delay of said test heterodyne interferometer.

1 15. (original) The method of claim 14 wherein generating said time series
2 further includes determining a difference between said first and second
3 differences for each said time t.

1 16. (original) The method of claim 13 further comprising the step of coupling
2 a device under test (DUT) to said test heterodyne interferometer, said group
3 delay of interest representing delay being introduced by said DUT.

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1 17. (original) The method of claim 16 wherein coupling said DUT includes
2 connecting a length of fiber optic cabling under test.

1 18. (original) The method of claim 13 wherein said step of splitting said laser
2 light beam includes dividing a first beam portion into separate arms of said
3 test heterodyne interferometer and includes dividing a second beam portion
4 into separate arms of said reference heterodyne interferometer.